IN THE APPLICATION

OF

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FOR

Radon Venting Concrete Forms

FILED WITH

THE UNITED STATES PATENT AND TRADEMARK OFFICE

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to concrete forms and, more specifically, to a concrete form system for building foundations wherein two substantially parallel walls are constructed using a plurality of wall sections that mechanically interlock end-to-end with each wall section being rectangular in shape when viewed in cross section with a ribbed exterior portion for added strength and a substantially hollow interior that forms a conduit and is conducive to providing ventilation for effective and efficient radon remediation from the structure being constructed.

The present invention uses a combination of straps and spreaders to maintain the two wall sections in place prior to and during the pouring of the concrete.

Description of the Prior Art

There are other concrete form systems for use in constructing building foundations. Typical of these is U.S. Patent No. 3,613,323 issued to F. J. Hreha on Oct. 19, 1971.

Another patent was issued to T. Higuchi on Nov. 14, 1978 as U.S. Patent No. 4,124,963. Yet another U.S. Patent No. 4,186,160 was issued to G. H. Landreth on Jan.29, 1980 and still yet another was issued on May 3, 1983 to J. H. Koester as U.S. Patent 4,381,630.

Another patent was issued to F. H. Adams on Feb. 27, 1990 as U.S. Patent No. 4,903,450. Yet another U.S. Patent No. 5,120,162 was issued to A. F. Parker Jun. 9, 1992 and still yet another was issued to J. L Jacobus on Mar. 21, 1995 as U.S. Patent No. 5,399,050 and M. R. Baum was issued U.S. Patent No. 5,406,758 on Apr. 18, 1995. U.S. Patent No. 5,474,400 was issued on Dec. 12, 1995 to C. J. Kliefoth et al. T. M. Palmer issued U.S. Patent No. 5,475,950 on Dec. 19, 1995. On Dec. 24, 1996 John Hess, III was issued U.S. Patent No. 5,586,416 and A. F. Paker was issued U.S. Patent No. 5,694,723 on Dec. 9, 1997. A. S. Shepard, III was issued U.S. Patent No. 5,740,638 on Apr. 21, 1998 and on Jun. 30, 1998 A. F. Parker was issued U. S. Patent No. 5,771,643.

U.S. Patent Number 3,613,323

Inventor: Fred J. Hreha

Issued: Oct. 19, 1971

This specification discloses a form intended for use in the casting of concrete or cement foundations and which has a drain tile integral with an element thereof. The form comprises two flat walls sections detachable connected. A drain tile is integrally formed on the lower wall section and is of a rectangular cross section presenting spaced horizontal walls and a side wall. The latter is formed with a plurality of spaced drainage openings and the horizontal walls are formed at spaced intervals with aligned slot-like apertures adjacent to the wall section from which they extend. Stakes are driven through these apertures and nailed to the upper wall section of the form. A mechanical interlock between the lower wall section and the material cast is provided and may take different forms.

U.S. Patent Number 4,124,963

Inventor: Tadayasu Higuchi

Issued: Nov. 14, 1978

A process for forming a continuous footing for building a house comprising digging trenches in accordance with the layout of a house to be built, forming a rubble and gravel bed in the trenches, placing a plurality of leveling pieces on the bed and leveling only the leveling pieces by laying sand thereunder, placing footing blocks on the leveling pieces so as to bridge them, pouring gravel in the trenches, compacting the gravel and rubble so that they are tightly compacted under the footing blocks up to the bottom of the footing blocks, thereafter removing the leveling pieces, and finally placing gravel in the spaces which have been occupied by the leveling pieces and compacting the gravel under the joints of the blocks, is disclosed.

U.S. Patent Number 4,186,160

Inventor: George H. Landreth

Issued: Jan. 29, 1980

A method for forming three parallel elongate grooves of predetermined size and spacing in a hardenable building material during a plastic state thereof, for forming a perimeter-type building foundation.

U.S. Patent Number 4,381,630

Inventor: John H. Koester

Issued: May 3, 1983

A foundation vent structure is positioned upon the footing of a building below the lowermost row of concrete blocks of the basement wall and extends below the concrete floor of the basement. The vent structure is formed of a plastic material, preferably in strips, and is shaped to define alternate tunnels and channels having openings therein. The vent structure intercommunicates the openings in the hollow, concrete blocks with the drain area located along the marginal area below the basement wall to permit moisture to be vented into this drain area.

U.S. Patent Number 4,903,450

Inventor: Fred H. Adams

Issued: Feb. 27, 1990

A concrete footer block and foundation system formed therefrom for a concrete block wall is provided and comprises a plurality of elongate concrete masonry footer blocks positioned in side-to-side abutting relationship along an axis parallel to the concrete wall to be supported by the foundation system. The footer blocks include an enlarged triangular cavity therein which extends across the footer block and downwardly into at least the middle portion of the block. The cavity is open on each side of the block as well as at the top surface thereof and has a bottom surface which is parallel to the bottom surface of the footer block and includes a plurality of spaced-apart first support ribs extending across the block and at least one second support rib extending perpendicularly to the first support ribs and parallel to the lengthwise direction of the footer block for supporting, respectively, reinforcement wire and reinforcement rods thereon in spaced-apart relation from the bottom surface of the cavity.

U.S. Patent Number 5,120,162

Inventor: Alton F. Parker

Issued: Jun. 9, 1992

A concrete footing/foundation retainment co-features integral (unitary) drainage means. Two preferred embodiments present, first, a rigid, environmentally nondegradable and free-standable footing/foundation concrete retainment form similar to an ordinary plank but featuring a hollow core which communicates through a multiplicity of foramens (holes) with only one face of the plank, the other being smooth and generally unrelieved in character. The second preferred embodiment presents a similar plank bearing a colinear, foraminous conduit adjacent one margin of the plank and permanently joined with the plank member. Thus, in the second embodiment, only one face is essentially smooth and unrelieved, while the other, in cross-section, appears bulbous. The bulbous feature may take on any conceivable geometric definition ranging from a semi-tubular to a rectangular conduit shape. The invention is composed of a material that lends itself, not only to environmental nondegradability, but also to ready cutting, melting or abrading. This feature allows the forms, when set as a footing/foundation retainment, to be miter-cut and, thereafter staked in place with, or without, subsequent gluing or welding by known adhesive or heating means.

U.S. Patent Number 5,399,050

Inventor: James L. Jacobus

Issued: Mar. 21, 1995

A thermoplastic sidewall forms one surface of a concrete form. The sidewall incorporates a drainage tile as an integral unit. Two of the sidewalls combined can provide a form for a concrete footer to be poured and remain as a permanent part of the structure.

U.S. Patent Number 5,406,758

Inventor: Melvin R. Baum

Issued: Apr. 18, 1995

A combined drain tile and form for a foundation perimeter drainage system includes a hollow tubular drain tile, having a longitudinal opening along one side, connected along the longitudinal opening to a planar form portion. The tubular portion has a plurality of drainage holes. The form portion acts as a wall for a concrete or cement form, thereby eliminating the step of removing the form prior to laying drain tile in a perimeter drainage system.

U.S. Patent Number 5,474,400

Inventor: Christopher J. Kileforth

Issued: Dec. 12, 1995

A permanent form-drain network adapted for radon remediation. A permanently installed form-drain system is partially piecewise modified and adapted to collect and remove radon gas from sub-slab, as well as basement and similar near-subterranean, portions of building. The partial piecewise modification of an existing form-drain includes adapting existing connector elements of the form-drain with vent tubes and differently molded pieces such as offset transition conduits and "T" shaped divergent conduits. The method for installing the invention conceives of the use of a radon accretion zone gas barrier made of an impermeable membrane.

U.S. Patent Number 5,475,950

Inventor: Thomas M. Palmer

Issued: Dec. 19, 1995

A lightweight permanent concrete footing form section includes a base sheet that is horizontal with substantially planar upper and lower surfaces. Side walls integral with the base append upward from the base in a generally vertical and planar direction. Ducts are attached to the side walls for carrying water away from the concrete footing after the concrete has been poured and set. Sections may be interconnected and dimensioned according to plans.

U.S. Patent Number 5,586,416

Inventor: John Hess, III et al.

Issued: Dec. 24, 1996

A footing/foundation form with an integral drain having two substantially parallel spaced apart, serpentuitous walls. Each wall includes a plurality of hollow tubes elevated "to grade" above an excavation bottom by a stake and clip mechanism with gravel filled between the elevated tubes and the excavation bottom such that the elevated tube and gravel both engage concrete poured between the walls. The tubes are common 10-foot PVC tubes with a plurality of holes positioned away from the footing/foundation thereby providing the form with an integral drain. The stakes are preferably pieces of reinforcing bar and the clips, while quite effective, are also inexpensively manufactured.

U.S. Patent Number 5,694,723

Inventor: Alton F. Parker

Issued: Dec. 9, 1997

A concrete slab and wall spacer with water and radon removal elements. The invention includes a cross-sectionally, L-shaped elongate strip of semi-rigid, non-biodegradable material. At least halfway up the entire elongate vertical leg of the L-shape may be a horizontally disposed projection which is integral with the strip. The spacer projection is placed against a wall, the L base resting on a portion of the footing subtended by the wall in a conventional spacer usage. A spacer may be provided for additional support of the L-shaped strip. This spacer is easily removable after the floating slab has set, or the spacer may be left in place for use as a decorative molding. Several applications for the strip, are disclosed, one being the sealing of the shelf to the abutting wall with placement of a gas impermeable membrane in an overlapping arrangement with the L base so as to form, relative to the strip and the abutted wall, an upper fluid region and a lower gas region. The gas region is vented by a conduit which penetrates the projection, while the water in the upper liquid region is removed by other conventional methods, conceivably by through-the-wall conduits or a sump region built into or adjacent the footing.

U.S. Patent Number 5,740,638

Inventor: Allen S. Sheppard

Issued: Apr. 21, 1998

A combination drainage system and radon gas venting system for a structure foundation as disclosed which utilizes solid rubber particle fill as a free draining and venting medium.

U.S. Patent Number 5,771,643

Inventor: Alton F. Parker

Issued: Apr. 21, 1998

A concrete slab and wall spacer with water and radon removal elements. The invention includes a cross-sectionally, L-shaped elongate strip of semi-rigid, nonbiodegradable material. At least halfway up the entire elongate vertical leg of the L-shape is a horizontally disposed projection which is integral with the strip. The spacer projection is placed against a wall, the L base resting on a portion of the footing subtended by the wall in a conventional spacer usage. The underside of the base of the L is generally relieved in order to allow transmigration of water and gaseous substances. Several applications for the strip are disclosed, one being the sealing of the shelf to the abutting wall with placement of a gas impermeable membrane in an overlapping arrangement with the L base so as to form, relative to the strip and the abutted wall, an upper fluid region and a lower gas region. The gas region is vented by a conduit which penetrates the projection, while the water in the upper liquid region is removed by other conventional methods, conceivably by through-the-wall conduits or a sump region built into or adjacent the footing.

While these concrete forms may be suitable for the purposes for which they were designed, they would not be as suitable for the purposes of the present invention, as hereinafter described.

SUMMARY OF THE PRESENT INVENTION

The present invention discloses a concrete form system for building foundations wherein two substantially parallel conduits are constructed using a plurality of conduit sections that mechanically interlock end-to-end with each conduit section being rectangular in shape when viewed in cross section with a ribbed exterior portion for added strength and a substantially hollow interior that forms a conduit and is conducive to providing ventilation for effective and efficient radon or other unwanted gas remediation from the structure being constructed. The present invention uses a combination of straps and spreaders to maintain the two conduit sections in place prior to and during the pouring of the concrete.

A primary object of the present invention is to provide a concrete form with radon venting capabilities.

Another object of the present invention is to provide a concrete form with radon venting capabilities that is substantially rectangular in shape with a hollow interior and two opposing open ends that form a conduit.

Yet another object of the present invention is to provide a concrete form with radon venting capabilities wherein the form is assembled by mechanically interlocking the individual form sections into one another in end-to-end fashion to form a wall and constructing a similar

form parallel to the first wall and using a combination of straps and spreaders to maintain the two wall sections in place prior to and during the pouring of concrete therebetween.

Still another object of the present invention is to provide a concrete form with radon venting capabilities wherein the exterior surface of the conduit section is ribbed to increase the strength thereof.

Another object of the present invention is to provide a concrete form with radon venting capabilities that is lightweight and portable.

Still yet another object of the present invention is to provide a concrete form with radon venting capabilities wherein the conduit wall sections have a hollow interior with a greater area to provide an efficient means for increased radon remediation.

Yet another object of the present invention is to provide a concrete form with radon venting capabilities that is inexpensive to manufacture and operate.

One more object of the present invention is to provide a concrete form with radon venting capabilities that is simple and easy to use.

Additional objects of the present invention will appear as the description proceeds.

The foregoing and other objects and advantages will appear from the description to follow. In the description reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments will be described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural changes may be made without departing from the scope of the invention. In the accompanying drawings, like reference characters designate the same or similar parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be more fully understood, it will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of the present invention.

Figure 2 is a perspective view of the components of the present invention.

Figure 3 is a cross sectional side of the conduit of the present invention.

Figure 4 is a top view of a structural foundation formed by the present invention.

Figure 5 is a front view of the present invention.

Figure 6 is a front view of the present invention in use.

Figure 7 is a sectional side view of the present invention in use.

Figure 8 is a sectional side view of the present invention in use.

Figure 9 is a sectional side view of the present invention in use.

LIST OF REFERENCE NUMERALS

With regard to reference numerals used, the following numbering is used throughout the drawings.

10	present invention
12	conduit
14	male end
16	female end
18	strap
20	spreader
22	corrugation
24	corrugation
26	foundation
28	footing
30	walls
32	soil
34	concrete footer
36	concrete
38	slab
40	rebar

42 vent

44 cross-vent

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following discussion describes in detail one embodiment of the invention and several variations of that embodiment. This discussion should not be construed, however, as limiting the invention to those particular embodiments since practitioners skilled in the art will recognize numerous other embodiments as well. For a definition of the complete scope of the invention, the reader is directed to the appended claims.

Turning to Figure 1, shown therein is a perspective view of the present invention 10. Shown are the components of the present invention 10 forming a foundation footing form. A plurality of conduit sections 12 having a male end 14 and a female end 16 are attached end to end forming spaced apart walls to receive the footing concrete thereinbetween. A plurality of straps 18 are positioned around the conduits 12 preventing spreading of the conduits as the concrete is being formed. The straps 18 also form a permanent part of the footing keeping the conduit 12 in engagement with the footing during the life of the structure. A spreader 20 is used to keep the conduits 12 spaced apart while the footing is being poured. Once poured, the spreaders 20 can be removed to be used again or they can also be used as permanent members of the footing and can serve as rebar supports.

Turning to Figure 2, shown therein is a front view of the present invention 10. Shown are the components of the present invention 10 forming a foundation footing form. A plurality of conduit sections 12 are attached end to end forming spaced apart walls for the footing

concrete. A plurality of straps 18 are positioned around the conduits 12 preventing spreading of the conduits as the concrete is being formed. The straps 18 also form a permanent part of the footing keeping the conduit 12 in engagement with the footing during the life of the structure. A spreader 20 is used to keep the conduits 12 spaced apart while the footing is being poured. Once poured the spreaders 20 can be removed to be used again or they can also be used as permanent members of the footing and can serve as rebar supports.

Turning to Figure 3, shown therein is a cross sectional side view of the conduit 12. Shown is a cross sectional view of the conduit 12 having a corrugated-like 22, 24 structure which has considerable structural integrity affording a raceway around the foundation footing that can be accessed to vent the enclosed air into the atmosphere. It should also be noted that the addition of a forced air system could be used to increase the metric volume of air into and out of the raceway.

Turning to Figure 4, shown therein is a top view of a structural foundation 26 having a footing 28 forming support for the structure upon which to build the walls 30 thereof. The present invention uses spaced apart sealed conduits 12 which can be used to vent radon laden air should the structure be found after completion to have unacceptable levels of radon contained therein

Turning to Figure 5, shown therein is a front view of the foundation 26 footing form of the present invention 10. The conduits 12 are positioned spaced apart and connected end to

end forming two sealed passages on each side of the foundation footing having means for keeping the conduits from spreading using a strap 18. A spreader member 20 keeps the conduits 12 in a spaced relation prior to the concrete being poured. The spreader 20 can be removed after the concrete has been poured having the mass of the concrete maintaining the spaced apart relation. Also shown is soil 32.

Turning to Figure 6, shown therein is a front view of the foundation footing form of the present invention 10 having a concrete footer 24 between the conduit members 12. The conduits 12 are positioned spaced apart and connected end to end forming two sealed passages on each side of the foundation footing 34 having means for keeping the conduits from spreading 18 during the pouring of the concrete and means to keep the conduits in a footing engaging position 20 during the life of the footing.

Turning to Figure 7, shown therein is a sectional view of the foundation footing form of the present invention 10 comprising spaced apart conduit 12 having means for keeping the conduit from spreading using a strap 18 that is left in place as part of the footing 34. A spreader (not shown but see Figure 8), keeps the conduits 12 in a spaced relation as concrete 36 is being poured. The spreader can be removed after the concrete 36 has been poured whereby the mass of the concrete will maintain the spaced apart relation as the concrete cures. Once the structure is completed, radon testing may reveal unacceptable levels present. The conduit 12 can be accessed by additional conduit providing means to vent the air to the exterior of the structure. Also shown are the wall 30, soil 32, and slab 38.

Turning to Figure 8, shown therein is a sectional view of the present invention 10 in use. Shown are the installed foundation form elements of the present invention. The form elements comprise spaced apart corrugated-like conduits 12 having a strap 18 to prevent spreading of the conduits as the concrete 36 is being poured and to keep the conduits in engagement with the footing concrete after curing. Also shown is a spreader 20 to keep the conduits 12 spaced apart prior to pouring the concrete 36. The spreader 20 can be used in a permanent installation as rebar support members 40 as deemed necessary. After curing the conduits 12 provide an air cavity around the interior and exterior of the foundation footing that can be accessed by means of other conduit either exteriorly or interiorly after a structure has been completed and unacceptable levels of radon are detected to vent the radon laden air or other unwanted gas into the atmosphere. Also shown are soil 32, wall 30, and slab 38.

Turning too Figure 9, shown therein is a sectional view of the present invention 10 in use showing the installed foundation form elements of the present invention where unacceptable levels of radon have been detected after the structure was completed. The present invention 10 provides a means for venting radon laden air, i.e., a vent 42, from around the foundation thereby reducing the amount of radon within the structure. The venting 42 can be done from one or both of the forms. A tradesman can access the interior conduit by drilling into the slab 38 and piping the air to the exterior of the building. At least one cross-venting pipe 44 may be installed during construction communicating between the two parallel conduits

12 to provide cross-venting therebetween. Also shown are strap 18, rebar 40, spreader 20, soil 32, wall 30, and concrete 36.